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and elbow is firmly ankylosed; fingers move, and arm is apparently going to be useful. Still in hospital on daily dressing, and granulating fast.

CASE XVII.—Wound of Left Leg: Severe Gas Infection.

B. H. This case is included to show the failure of a packing. The whole of the calf of the left leg was infected Pte. H. dressing.

-Case xiv. o, Operation. R, Repacked. c, Redressed; strapped. s, Sutured.

CASE XIII.—Compound Comminuted Fracture of Humerus:
Gas Infection.
Pte. C., admitted February 18th, 1916. Very severe comminution of middle of humerus for about 2½ inches; tissues full

minution of middle of humerus for about 2½ inches; tissues full of foul pus, skin bronzed and crepitant to a small extent. Exit wound behind was laid widely open, some loose fragments of bone removed. Salt-packed. Entry wound enlarged, and packed down to the bone. Put up in extension with complete abduction. February 21st: Repacked, a little cleaner; "arm looks hopeless owing to comminution of bone." March 1st: Redressed first time for nine days. Wound quite clean; strapped across; to be dressed and strapped daily. March 14th: To England. Wound very small, union becoming firm. (See Chart 7.)

CASE XIV .- Compound Fracture of Clavicle and

Case XIV.—Compound Fracture of Clavicle and

Scapula.

Pte. L., admitted with large very septic wound over left scapula. The outer third of clavicle and the upper edge and all the inner two-thirds of the spine of the scapula were blown away. The spine of the third dorsal vertebra was fractured. The brachial plexus and the subclavian vessels were exposed, and the artery was beating in the bottom of the septic cavity. The wound measured 8 inches by 6 inches. The wound was cleaned up under an anaesthetic, and a large salt pack applied firmly. The patient was so collapsed that 20 ounces of saline was given intravenously. B. perfringens grew freely from pus. Next day much better. On the third day temperature and pulse were normal, and he had no pain. On the tenth day the pack was removed. Wound was much cleaner, and granulating in places; still some sloughs adherent about edges of fractured bones. Repacked as before; slight temperature reaction. Pack removed eleven days later, wound quite clean and granulating. It was drawn together by strapping, and dressed daily with lotio rubra. Four days later the wound was sutured; the skin was approximated over the inner half of the wound, but the outer and upper half could not be united owing to loss of skin. It healed rapidly, and the patient went to England with the wound over his scapula and clavicle filling in fast. (See Chart 8.)

CASE XV.—Compound Fracture of Humerus involving Shoulder-joint.

Shoulder-joint.

Pte. R., admitted with wound over apex of right shoulder. X rays showed that head of humerus was in three fragments, and a long piece of shell lying in centre of bone, with a long fissure fracture of shaft. The whole joint was full of pus. Head of bone excised just below tuberosities, and piece of shell removed. The resulting cavity was packed with salt tablets and gauze. June 1st, 1916: Repacked; clean and red. June 8th: Repacked; filling in rapidly. June 13th: Redressed; now on daily dressing as cavity is rapidly obliterating. Can move arm a little. Has never had any pain in joint.

CASE XVI .- Fracture of Femur: Gas Infection.

Case xvi.—Fracture of Femur: Gas Infection.

Pte. S., admitted March 20th, 1916, with an enormous gaping wound of outer side of thigh. All the external muscles with half the hamstrings and half the anterior muscles of thigh were blown away. The wound was roughly cubical, about 5 in. each way. The femur was shattered, and about 2 in. were completely missing. The surrounding tissues were gassy and necrotic. Owing to the fact that the femoral vessels were intact, and also the sciatic nerve, and that his ankle movements were good, we decided to try and save the leg, although the attempt seemed hopeless. The necrotic tissue was cut away and a pack applied, loose fragments of bone being removed. March 23rd: Repacked; muscle on distal side of wound still necrotic and gassy; more cut away and repacked. March 27th: Repacked; cleaner. He was repacked every four or five days for five weeks, and then the wound became sluggish; put on to glycerine dressings and improved rapidly. May 15th: Necrosed pieces of bone removed. Put up in Thomas's splint with plaster-of-Paris bandages with ends of bone apposed, and window over wound. About 2 in. shortening at most. May 20th: Healing rapidly. May 23rd; Sent to England in good general condition.

with pus and gas
—skin bronzed and —skin bronzed and crepitant. June 9th, 1916: Laid freely open, saltpacked. June 11th: General condition much improved; no swelling of thigh. June 14th: Sudden great pain leg; tempera-

Sudden great pain in leg; temperature 101°, pulse 104; thigh swelling, foot going black, leg again full of gas. Is vomiting, and looks yellow. Circular no-flap amputation; salt pack applied. Amputation was performed 3 in. above knee; fat there looked yellowish-green and oedematous. Cultures from fat grew streptococci, but no gas. June 15th: Very comfortable. June 20th: Redressed for first time; surface of stump quite clean; repacked. Pulse has averaged 80 to 90. No pain; general condition good. Temperature reaction to 102.8° after

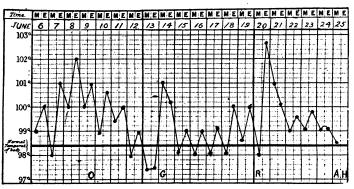


CHART 9.—Case XVII. o, Operation. G, Amputation. R, Repacked. dressed. H, Extension on stump.

dressing; pulse 92. June 25th: Redressed. Extension strapping to skin. Stump entirely covered with red granulations. (See Chart 9.)

A PLEA FOR IGNORING "LAUDABLE PUS" IN THE TREATMENT OF SEPTIC WOUNDS.

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A. J. WRIGHT, F.R.C.S., CAPTAIN R.A.M.C. (T.), BRITISH EXPEDITIONARY FORCE.

EXPERIENCE has taught us that the presence of pus in a well-drained septic wound is certainly no impediment to healing, whilst the disturbance necessary for its frequent removal retards the process of repair.

Having started as confirmed sceptics ourselves, and having passed through all stages of doubt, it is easier to appreciate the difficulties that other people will have in overcoming the prejudice against the formation of pus and the accompanying smell associated with "infrequent dressings." It is not difficult to prove that the presence of pus, if not under pressure, gives rise to no ill effect to the patient. Cases have been left considerably more than a week without change of dressing, and during that time the temperature and pulse remained normal and the patient's appetite rapidly improved.

The mental relief to the patients due to the knowledge that painful dressings are to cease is very great indeed. In the acute stages it is much more difficult to realize the necessity for absolute rest to the inflamed tissues, and this is unobtainable except in the absence of frequent dressings. The difficulty here arises from the fact that the patient has already a high swinging temperature and rapid pulse so that the disturbance due to the dressing is not so obvious on the temperature chart. The accompanying charts show, however, that the temperature and pulse,

although possibly very alarming in the first few days after the operation of drainage, soon settle down without any dressing being changed.

It will be clearly understood that there are certain

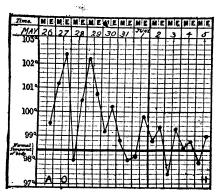


CHART 1.—Case I. A. On admission. o. Operation. H. Dressed and sent on hospital ship.

for special treatment; for example, some septic arms and legs are opened up and put straight in saline baths. These cases, however, are outside the object of the present paper; likewise wounds of the head and thorax; but, after nine months of trial, we have adopted the

following general line of treatment in the majority of septic wounds.

General Plan of Treatment.

The patient is taken to the theatre and the wound thoroughly opened up, foreign bodies removed, and all blood clots washed out of the wound with some antiseptic

Increase in pain and tenderness are of some significance. but a rise of temperature in itself is of very little value. cases which call Pocketing is indicated in the chronic stages by a stepladder rise in temperature and pulse, with increase of tenderness. Recently one of us (A. J. W.) has been trying

sistently rising pulse points to the same cause.

tight bandages in these chronic cases where there is a tendency to this complication, in order to approximate the walls and obliterate the cavity of the pocket. The results

The pulse-rate at this stage is also valuable, as a per-

of such treatment are distinctly promising.

To sum up, then, a change of dressing in the acute stage is only justifiable for purposes of investigation to see where further drainage is necessary. In the chronic stages a change of dressing should be carried out in order to approximate the walls of the wound, or to open a pocket of pus which is under pressure.

Various criticisms and objections, mostly based on theory, have been offered to this line of treatment.

1. Smell.—This can be avoided to a large extent by changing the outside packing (if this does not involve the disturbance of the limb or patient) and by putting large quantities of "eupad" between the layers of wool.

2. Absorption.—Many people consider that if pus is present deleterious absorption of toxins must take place. Of this, however, there is not a scrap of evidence, provided

that the pus is not under pressure.

3. Pocketing.—It is difficult to disprove such criticism, as pocketing takes place under any line of treatment, but in our opinion this complication arises less frequently now than it did a year ago before we adopted the principle of "infrequent dressings."

4. Haemorrhage.

Secondary haemor-rhages are liable to occur in any septic wounds near an artery, more especially if the vessel had been pre-The viously injured. only method of pre-venting this complica-tion is to do away with conservative surgery and to amputate every septic limb.

5. Skin Irritation.-Occasionally, where the wound is in a position of pressure, such as wounds of the

back, the skin does become slightly irritated by the purulent discharge, but this can easily be remedied by changing the outside dressing rather more fre-

quently.
6. Delayed Healing.—The evidence, in our opinion, points to the fact that a wound which is undisturbed undoubtedly heals more rapidly than one in which the

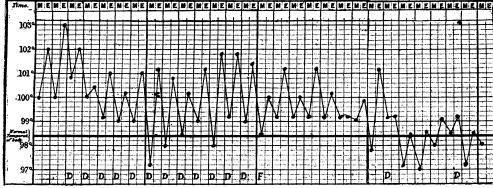


CHART 2.-Case II. D. Dressed. F. Dressed under anaesthetic.

such as eusol. It is then packed with gauze, in the folds of which are numerous saline tablets, and a moist dressing placed on the outside. In the case of large wounds the limb is immobilized by some kind of splint, even if there is no fracture of bone.

In our experience it is advisable to leave the patient for In our experience it is advisable to leave the patient for about a week without changing anything except the outside dressing, which after the first few days becomes soaked with purulent discharge. During the first three or four days the temperature and pulse are often unpleasantly high, and it requires great self-restraint not to dress the case. At the end of the week the temperature and pulse have generally subsided, and when the wound is dressed it will be found that the gauze is no longer adherent and the plugging comes away without difficulty, being soaked in a thick pus. away without difficulty, being soaked in a thick pus. The wound is then gently irrigated and healthy well-

formed granulations are seen everywhere.

After this we change the dressings rather more frequently in order to approximate the surfaces of the wound by the use of plaster strapping or in suitable cases by secondary sutures. In most cases the extent of the pack is reduced at each dressing, while the same equable pressure is maintained by slightly tightening the external bandages.

Signs Justifying Change of Dressings.

What, then, are the signs to justify the change of a dressing in the acute stage? The most important sign

Increase in swelling and oedema. This means that the original drainage operation was not sufficiently drastic.

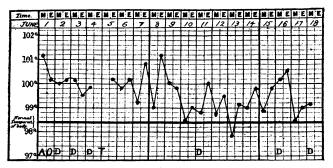


CHART 3.—Case III. A, On admission. o, Operation. D, Dressed. T, In the train, dressed with saline tabloid.

granulating surface is torn open every day by the removal of adherent gauze.

We do not wish people to think that we claim invariable success. Like most, we have had a few cases which became rapidly worse in spite of all our efforts. It is unnecessary to publish charts illustrating those 288

Finally, we should like to state that this line of treatment is not founded upon any theory, and therefore should not be rejected on purely theoretical grounds, but should be given a fair practical trial.

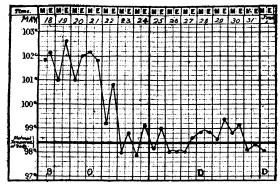


CHART 4.—Case IV. B, Bath (saline). o, Operation.
D Dressed.

Case I (Chart 1).—The patient was admitted with a deep wound of the thigh with no exit. The temperature two days after admission—that is to say, four days after the patient was wounded—rose to 102.6°. A large tracking abscess was found in connexion with a piece of shell. The foreign body was removed and the wound widely opened up and a dependent

wool was not impregnated with eupad. The chart is typical of minor injuries.

wool was not impregnated with eupad. The chart is typical of minor injuries.

CASE VI (Chart 6).—On admission to hospital this patient was suffering from a septic discharging wound on the right buttock and beneath the left scapula, with other minor injuries. On account of formation of an abscess in the back with rise of temperature and pulse, he was put under an anaesthetic and the wound explored. A foreign body was removed from the buttock and the wound freely drained with gauze and soloids. The abscess cavity was opened up from end to end, and a track leading from the lower excision was explored and found to lead to a foreign body at the level of the fourth lumbar vertebra. This foreign body did not show on the x-ray screen. It was removed by an incision directly over it, and this incision also drained with soloids and gauze; the patient was then placed on a water bed. On the fifth day the superficial dressings were changed on account of the objectionable smell. The skin surrounding the wound was treated with ointment spread on lint on account of the superficial inflammation. The deeper dressing—that is, gauze drains—was not removed until the ninth day after operation. On the eleventh day another dressing was performed because of the unsatisfactory temperature and pulse. The wounds were packed with gauze soaked in normal saline solution. Two days later, however, the chart records being still unsatisfactory, it was resolved again to anaesthetize the patient and seek for cause of continued rise of temperature. This proved to be another foreign body in a small wound below the right scapula, round which an abscess had formed; the removal of the foreign body and free drainage of the abscess were followed by an immediate improvement, and on discharge from this hospital all the wounds, although freely bathed in pus, were granulating healthily. This case illustrates, first, the necessity of free drainage, and secondly, that if the cause of a further rise in temperature cannot be dis-

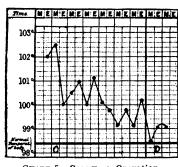
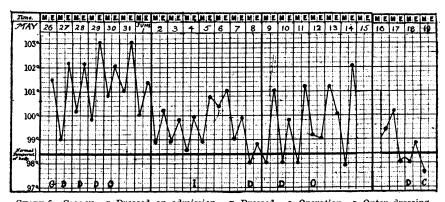


CHART 5.—Case v. o. Operation. D. Dressed.



on admission. p, Dressed. o, Operation. 1, Outer dressing changed. c, Sent to England. CHART 6.—Case VI. G, Dressed

incision made, and the whole wound packed in the usual way with soloids and gauze. When this case was dressed for the first time after operation several Swiss medical officers were present. After noting the normal temperature and pulse recorded in Chart 1, they were surprised to find the dressing and wound soaked with pus, and still more to see beneath this a surface covered with healthy granulations.

Case II (Chart 2).—An officer, suffering from a large flesh wound of the thigh. For some time he was dressed daily, and then left for seven days. The patient himself was very willing to put up with the slightly unpleasant odour in order to escape the painful dressing. It will be noticed that the temperature and pulse at once became more steady.

CASE III (Chart 3).—Compound fracture of tibia and fibula. The wound extends of tibia and fibula. The wound extends from an inch above the ankle to two inches below the knee. In this area the whole of the front of the leg was blown away, leaving only the posterior half of the tibia and the fibula, both of which were comminuted, and the culf muscles. The tibia looked just like a broken gutter from a roof. The pulse and temperature were so good that it was decided to make it a test case and see whether the orthopaedic surgeons in England would consider it possible to do anything with such a limb. When the patient left for England the whole surface was covered with healthy granulations.

CASE IV (Chart 4).—A patient who had

CASE IV (Chart 4) .- A patient who had a large wound of the upper arm. It was treated by baths for three days and then further drained and packed with salt and gauze. When dressed at the end of seven days granulations were found to be perfect.

Case v (Chart 5).—Compound fracture of ulna and radius. The dressing was offensive to the patient. In this case the

covered by means of an ordinary dressing an anaesthetic should be given and a thorough search made.

VII (Chart 7).-This patient is still in hospital, and CASE VII (Chart 7).—This patient is still in hospital, and although his chart is not very remarkable, the rapidity with which a filthy sloughing wound became covered with healthy granulations was astounding. The patient was admitted with a wound in the lumbar region without an exit. In the left buttock there was a large-sized entrance wound and a corresponding exit wound in the right buttock. X rays showed a foreign body near the transverse process of the fourth vertebra.

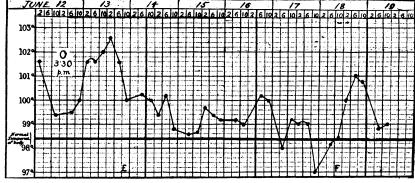


CHART 7.—Case VII. O. Operation. E. Out on balcony. F. Dressed under anaesthetic.

In the upper wound the spine and laminae of the vertebra were found to be fractured, and were removed, together with a foreign body. Next the two lower wounds were joined by a long incision. It was then found that the lower part of the sacrum and coccyx were damaged, and had to be excised. Large pieces of slough and khaki were removed, and the whole wound packed with gauze and soloids. On the sixth day the patient was dressed under an anaesthetic. The old wound had been transformed into a granulating surface, as mentioned above, but the temperature, as is so often the case, rose after the dressing.

SECONDARY INFECTIONS OF JOINTS IN ACUTE MEDICAL AILMENTS.

LIEUT.-COLONEL G. H. EDINGTON, R.A.M.C.(T.F.).

SECONDARY infections of joints may occur from wounds or other surgical lesions in the neighbourhood or in a distant part of the body, or they may occur as a complication in medical cases. It is with the latter group that I propose to deal, but I would like in passing to mention examples of the others.

Joint Infections Secondary to Wounds or other Surgical Lesions.

These cases fall into two classes:

1. A wound in the neighbourhood of but not primarily involving a joint becomes septic, and the process spreads directly into the joint. One of the best examples of this is a septic wound or abrasion on the dorsum of a finger, over an interphalangeal joint. The bursa may become involved, in which case septic arthritis, followed by ankylosis, will most probably ensue.

2. Joints may become the seat of pyaemic infection, the primary lesion being in a distant part of the body. As an example of this there occurs to me the case of a young lad I saw some years ago, and in whom removal of enlarged turbinal bones was followed by pyaemic infection of wrist

and knee joints.

Secondary Joint Infections in Medical Cases.

It is, however, with joint infections which occur as a complication in medical cases that I am immediately concerned. Several examples have come to my notice within the last few weeks in this hospital, and form the basis of the following remarks.

Case I.—Bronchopneumonia, Pneumococcic Abscess of Knee, and later Pneumococcic Abscess in Buttock.

Pte. B., aged 20, admitted to a medical ward under the care of Captain De Boer on March 15th, with cough and pain in chest. Examination showed bronchopneumonia, chiefly in left base. Two days later complained of pain in right knee, which began to swell. Subsequently whole limb became swollen. Needle withdrew from joint some turbid fluid which showed pneumococci in film and in culture. He was transferred to surgical division, where joint was opened and drained. One month later large abscess formed in left buttock; pus contained pneumococci.

It was not possible to obtain a history of the date of onset of the pulmonary condition, but it was several days before admission to hospital. The joint condition was a complication rather than a sequela, successive consolidation of different areas of lung tissue being noted during the healing of the joint lesion.

There was nothing in the history to suggest any reason for the implication of the joint in the infection.

CASE II.—Coxitis (Streptococcic); Empyema (Pneumococcic).

CASE II.—Coxitis (Streptococcic); Empyema (Pneumococcic). Pte. H., aged 28, was operated on for empyema of left chest on March 9th, the pus showing micrococci encapsulated. The empyema had followed post-influenzal pneumonia, during the third week of which he began to have pain in the right leg. At time of operation on the empyema there was some fullness and pain in right hip, and extension was applied to limb. Ten days later there was fluctuant swelling occupying Scarpa's triangle and lower part of iliac fossa. Pus drawn off by syringe showed streptococci in film and in culture. The abscess was opened, and the cavity found to correspond with lower part of iliacus muscle, extending downwards and inwards behind femoral vessels. No gross communication with hip-joint discovered, but signs of coxitis were unmistakable, and left no doubt as to origin of the abscess.

The pathological relationship of the coxitis to the empyema is at first sight somewhat obscure. But primary suppuration of a joint is so uncommon that we are justified in considering it in the present case to be directly related to the chest condition, in which there was probably a mixed infection.

There was nothing in the history to explain the joint implication.

CASE III.—Suppuration in Knee-joint during Alleged-Cerebro-spinal Fever.

Case III.—Suppuration in Knee-joint during Alleged-Cerebro-spinal Fever.

Chief Officer T., aged 31, was admitted from another hospital to the isolation ward, under Lieutenant N. S. Gilchrist, on March 20th, with history of headache and fever beginning fourteen days previously. The condition had been diagnosed "cerebro-spinal fever," and turbid fluid obtained by lumbar puncture. The fluid did not contain any meningococci, but antimeningococcal serum had been injected. He did well as regards general symptoms, but the left knee had become swollen, and the condition was regarded as metastatic. On the patient's admission to the isolation ward Lieutenant Gilchrist did not find any signs of meningitis. He aspirated the knee and withdrew thin purulent fluid containing many puscells and a few scattered extracellular Gram-negative diplococci; culture failed. The following day aspiration was repeated and the fluid again showed many puscells, but no organisms in film. Culture gave chains of streptococci, and many weakly Gram-positive bacilli not corresponding morphologically with any known pathogenic organism.

A history of gonorrhoea two and a half years previously was elicited, and there was doubt as to whether the knee condition was not a late sequela of gonorrhoea. As there were during his stay in isolation ward no signs of cerebro-spinal fever, he was transferred on March 27th.

We have here three cases in which joint infection

We have here three cases in which joint infection occurred secondarily to a medical condition, and the points which come up for discussion are: (1) Symptomatology; (2) the exciting cause of the joint implication; (3) its influence on the course of the disease; (4) prognosis; and (5) the treatment of the joint condition.

1. Symptomatology.—It is not my intention to spend time on the symptomatology of synovitis, either general or

time on the symptomatology of synovitis, either general or with special reference to individual joints; I would, however, very briefly refer to the joints affected in the cases

just mentioned.

In a patient suffering from an acute ailment such as pneumonia the occurrence of pain in a joint demands investigation. In the case of the knee inspection alone is often sufficient, the filling up of the natural hollows of the joint being an early feature. In the hip, however, marked swelling in the early stage is unlikely, and careful examination of this joint should be made. If coxitis be unrecognized in the early stage and allowed to go untreated, it may be found later that subluxation has taken place.

2. Exciting Cause.—It is usual to explain the implication of the joint as a metastasis occurring in a part whose natural power of resistance has been lowered; and in support of this explanation trauma is usually invoked. I do not deny that diminished power of resistance has allowed of a successful microbic attack; but even if such be admitted, it does not bring us much, if any, nearer to an explanation of the occurrence. We are still facing the problem of what has caused the lowering of the resisting power of the part.

In none of the cases related above was there any history of an injury to the joint; this is important when we bear in mind the very human tendency to hark back. It has always seemed to me that the story of precedent injury, frequently trifling, of which so much is made when viewed in the light of subsequent events, often rests on a slender foundation. We meet with it in acute cases, and also when investigating cases of tuberculous joint disease.

Even if we assume that secondary implication of a joint points to severity of the primary infection—large dose, or particularly virulent strain—we have still to answer the question as to the choice of location of secondary infection. Here we are in most cases thrown back again on theory. In the cases just given I am not able to throw any light on

the causation.

3. Influence on Primary Disease.—It seems to me that the occurrence of joint infection must have an appreciable effect on the course of the disease. It may or may not be evidence of severity of infection; but it undoubtedly adds' to the patient's sufferings, and imposes an additional tax upon his powers of recovery. Further, the special treatment of the joint lesion often imposes on the patient a degree of immobilization not only irksome, but, in the case of chest affections, harmful by increasing the risk of

hypostatic congestion of the lung.
4. Prognosis as to Joint.—The prognosis with regard to the joint depends on the degree of infection and consequent reaction of the articular tissues. For example, arthritis involving the cartilages spells as a rule ankylosis; while synovitis, especially where the effusion is not purulent, may be followed by fairly complete restitution.